AMENDMENT TO THE CLAIMS

This listing of claims replaces all prior versions of listing of claims, and the listing of claims in the application.

Listing of Claims

1. (Currently Amended) A microfluidic manipulator for an adsorbed fluid, comprising: a material having a ~~two-dimensional~~ surface for adsorbing fluids, said material provided with a plurality of individually controllable thermal elements that produce thermal gradients on said ~~two-dimensional~~ surface that produce surface tension gradients at the interface between the adsorbed fluid and said ~~two-dimensional~~ surface sufficient to cause the adsorbed fluid to move on said ~~two-dimensional~~ surface; wherein one or more of said thermal elements are controlled to transport adsorbed fluids in a desired path on said ~~two-dimensional~~ surface and wherein the manipulator is devoid of micro-channels that limit movement of the fluid to a predefined route.

2. (Original) The microfluidic manipulator of claim 1 wherein said individually controllable thermal elements are controlled to produce a surface temperature on a portion of said surface sufficient to adsorb fluids onto said portion of said surface.

3. (Original) The microfluidic manipulator of claim 1 wherein said individually controllable thermal elements are controlled to produce a surface temperature on a portion of said surface sufficient to desorb adsorbed fluids from said portion of said surface.

4. (Original) The microfluidic manipulator of claim 1 further comprising a power source for providing electrical signals to said thermal elements.

5. (Original) The microfluidic manipulator of claim 4 wherein said power source is selected from the group consisting of a power supply, batteries, analog or digital output modules, a pulse generator and a programmable DC power supply.

6. (Original) The microfluidic manipulator of claim 4 wherein the amplitude of said electrical signal is controlled by said power source.

7. (Original) The microfluidic manipulator of claim 4 wherein the phase and delay of said electrical signal is controlled by said power source.

8. (Original) The microfluidic manipulator of claim 4 wherein the frequency of said electrical signal is controlled by said power source.

9. (Original) The microfluidic manipulator of claim 4 wherein the pulse width of said electrical signal is controlled by said power source.

10. (Original) The microfluidic manipulator of claim 4 wherein the current limit of said electrical signal is controlled by said power source.

11. (Original) The microfluidic manipulator of claim 4 wherein said electrical signal is programmably controlled.

12. (Original) The microfluidic manipulator of claim 4 wherein said electrical signal is manually controlled.

13. (Original) The microfluidic manipulator of claim 1 further comprising a means for the selection of which of said thermal elements receive said electrical signals.

14. (Original) The microfluidic manipulator of claim 13 wherein said thermal elements selection means is selected from the group consisting of relays, switches, multiplexers, data acquisition modules, field programmable gate arrays, and application specific integrated circuits.

15. (Original) The microfluidic manipulator of claim 13 wherein said thermal elements selection means provides for two or more of said thermal elements to be collectively selected.

16. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are connected in series with resistors for monitoring the current through said thermal elements.

17. (Original) The microfluidic manipulator of claim 16 wherein said thermal elements are feedback controlled by said monitoring current through said thermal elements.

18. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements protrude from said surface.

19. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are flush with said surface.

20. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are within said material beneath said surface.

21. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements take the form of round dots on said surface.

22. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements take the form of square dots on said surface.

23. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements take the form of round and square dots on said surface.

24. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements take the form of straight lines.

25. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements take the form of curved lines.

26. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements take the form of straight lines and curved lines.

27. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements take the form of both dots and lines.

28. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are arranged uniformly spaced with respect to each other.

29. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are arranged unevenly spaced with respect to each other.

30. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements take the form of straight or curved lines that cross each other on said surface.

31. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements take the form of straight or curved lines that do not cross each other on said surface.

32. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are arranged as an orthogonal structure on said surface.

33. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are arranged as non-intersecting closed lines on said surface.

34. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are arranged as concentric circles on said surface.

35. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are resistive heaters.

36. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are Peltier Effect junctions.

37. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are a combination of resistive heaters and Peltier Effect junctions.

38. (Original) The microfluidic manipulator of claim 1 wherein at least one of said thermal elements is a thin metal film selected from the group consisting of gold, platinum, palladium, aluminum, nickel, copper and chrome.

39. (Original) The microfluidic manipulator of claim 1 wherein at least one of said thermal elements is made of a compound selected from the group consisting of

hafnium diboride, titanium-tungsten nitride, cobalt silicide, titanium silicide, molybdenum silicide, tungsten silicide and magnesium silicide.

40. (Original) The microfluidic manipulator of claim 1 wherein said thermal elements are made by ion implantation.

41. (Original) The microfluidic manipulator of claim 1 wherein said material is a semiconductor selected from the group consisting of silicon, gallium arsenide and germanium.

42. (Original) The microfluidic manipulator of claim 1 wherein said material is an insulator selected from the group consisting of silicon dioxide, silicon nitride, silicon carbide, diamond, sapphire, ceramic, silica glass, fused silica, fused quartz and mica.

43. (Original) The microfluidic manipulator of claim 1 wherein said material is a polymer selected from the group consisting of silicone rubber and polyimide.

44. (Original) The microfluidic manipulator of claim 1 wherein said material is rigid.

45. (Original) The microfluidic manipulator of claim 1 wherein said material is flexible.

46. (Original) The microfluidic manipulator of claim 1 wherein said adsorbed fluid is desorbed to a nearby detector device.

47. (Original) The microfluidic manipulator of claim 46 wherein said detector device is a MEMS sensor.

48. (Original) The microfluidic manipulator of claim 47 wherein said MEMS sensor is a microcantilever detector.

49. (Original) The microfluidic manipulator of claim 46 wherein said detector device is a surface acoustic wave detector.

50. (Original) The microfluidic manipulator of claim 46 wherein said detector device is an anion mobility mass spectrometer.

51. (Original) The microfluidic manipulator of claim 1 wherein said material is integrated with a detector device.

52. (Original) The microfluidic manipulator of claim 51 wherein said detector device is a MEMS sensor.

53. (Original) The microfluidic manipulator of claim 52 wherein said MEMS sensor is a microcantilever detector.

54-265 (Cancelled)